

# A Matter of Economics – Calculating Exchange Rates

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## Objective(s)

- Simplify the process of comprehending currency exchange
- The Big Mac Index will help explain variation in exchange rates and prices
- Using the Big Mac Index, you will be able to quickly and easily determine the value of goods and services in any exchange
- Understand the buying power of your dollar in each country you visit

## Introduction

Much of this lesson has been compiled by referencing the Big Mac Index published by the Economist. The Big Mac, perhaps the world's most popular sandwich, was created in 1968 by a McDonald's franchisee in Pittsburgh, Pennsylvania. Economists see the sandwich as a consumer good that is sold at over 25,000 McDonald's restaurants in 116 countries around the world. Because of its popularity, the Big Mac allows economists to make comparisons of exchange rates and relative prices in countries around the globe.

## Foreign Exchange

When traveling to another country you need to pay for products and services of the country that you are visiting in the applicable currency. The practice of converting one currency into another is called currency conversion or foreign exchange.

It is standard practice to compare local currencies to the US Dollar because it is a convenient common denominator. An estimated 80% of all the foreign exchange transactions around the globe involve US Dollars.

## Buying Power

Buying power is the term used to measure the relative value of different currencies, i.e. to determine what buying power our currency has relative to another currency. One must compare the price of the same item in both countries. The basic idea is simple, but you have to convert currencies to make the comparison. It's not easy to compare prices around the world unless you have an item that is the same in all countries. *The Economist*, a British magazine, got the idea that you could use the price of a MacDonald's hamburger to compare prices around the world. Big Macs are a standardized product, whether you buy one in Russia, Brazil or South Africa.

## Application

### The Big Mac Index

While the Big Mac is not strictly tradable between countries, it is sold to consumers in 116 countries around the world. It is a truly global consumer product. Since 1986, *The Economist* magazine has tracked the price of the Big Mac around the world. Information about local Big Mac prices has been combined with foreign exchange rates to serve as an unscientific indicator of future movements in currency exchange rates. Purchasing power parity theory is applied to the current dollar price of Big Macs in countries around the world to determine the extent to which currencies are over- or under-valued.



### The Hamburger Standard (based on Jan 15, 2003 data)<sup>1</sup>

Country	BigMac Price		Actual Exchange Rate 1 USD =	Over(+) / Under(-) Valuation against the dollar, %	Purchasing Power Price
	in Local Currency	in US dollars			
United States	\$2.65	2.65	1.00	-	-
Argentina	Peso 3.85	1.3167	2.924	-50.4104	1.45
Australia	A\$3.20	2.4561	1.3029	-12.5029	1.14
Brazil	Real 4.50	1.7033	2.642	-35.6548	1.70
Britain	£1.99	3.7315	1.8751	40.6338	0.75
Canada	C\$3.20	2.6182	1.2222	-0.9982	1.21
China	Yuan 9.95	1.2007	8.2865	-54.7457	3.75
Euro area	€2.75	3.5324	0.7785	32.3057	1.03
Hong Kong	HK\$11.25	1.4424	7.7997	-45.6389	4.24
Hungary	Forint 492	2.5523	192.77	-3.512	186
Indonesia	Rupiah 16,155	1.7025	9488.8	-35.7558	6,096
Japan	¥263	2.4282	108.31	-8.2264	99.40
Malaysia	M\$5.10	1.3417	3.8012	-49.4896	1.92
Mexico	Peso 22.0	1.9632	11.206	-25.9325	8.30
New Zealand	NZ\$3.95	2.7943	1.4136	5.4046	1.49
Poland	Zloty 6.30	1.9679	3.2014	-25.6575	2.38
Russia	Rouble 40.00	1.4337	27.9	-45.914	15.09
Singapore	s\$3.30	1.9807	1.6661	-25.5747	1.24
South Africa	Rand 14.05	2.2467	6.2535	-15.2475	5.3
South Korea	Won 3,211	3.1536	1018.2	18.9354	1,211
Sweden	Skr 30.0	4.196	7.1497	58.3283	11.32
Switzerland	SFr 6.35	5.2484	1.2099	98.3635	2.40
Taiwan	NT\$70.55	2.228	31.665	-15.9324	26.62

Thailand	Baht55.0	1.3896	39.579	-47.5732	20.75
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‡ Dollars per pound

### Purchasing Power Parity (PPP):

is a measure of the relative purchasing power of different currencies. It is measured by the price of the same goods in different countries, translated by the FX rate (or exchange rate) of that country's currency against a "base currency".

### How to read this table:

In this case, the goods is the Big Mac. For example, if a Big Mac costs €2.75 in the countries that use Euro and costs \$2.65 in US, then the PPP exchange rate would be  $2.75/2.65 = 1.0377$ . If the actual exchange rate is lower, then the Big Mac theory says that you should expect the value of the Euro to go up until it reaches the PPP exchange rate. If the actual exchange rate is higher, then the Big Mac theory says that you should expect the value of the Euro to go down until it reaches the PPP exchange rate.

The Over/Under valuation against the dollar is calculated as:

$$\frac{(\text{PPP} - \text{Exchange Rate})}{\text{Exchange Rate}} \times 100$$

For up-to-date exchange rates, go to:

<http://www.angelfire.com/id/SergioDaSilva/bigmacppp.html>

**Practice lesson attached.**

### References

[http://www.economist.com/markets/bigmac/displayStory.cfm?story\\_id=4065603](http://www.economist.com/markets/bigmac/displayStory.cfm?story_id=4065603)

<http://www.oanda.com/products/bigmac/bigmac.shtml>

<http://www.econedlink.org/lessons/index.cfm?lesson=EM156>

### Practice

Big Mac prices in 2003 are shown below. It shows how much the very same hamburger would cost in terms of the US Dollar in each of the countries.

Column 1	Column 2	Column 3	Column 4	
Country	Big Mac Price		Actual Exchange Rate 1 USD = ZAR 7.19 (as on 15 Jan 2004 Big Mac prices in terms of ZAR)	
	In Local Currency	In US dollars	In SA Rands	
United States	\$2.65	\$2.65	ZAR	ZAR 19.05
Argentina	Peso 3.85	\$1.32	ZAR	
Australia	A\$3.20	\$2.43	ZAR	
Britain	£1.99	\$3.57	ZAR	
Canada	C\$3.20	\$2.46	ZAR	
China	Yuan9.95	\$1.20	ZAR	
European Union	€2.75	\$3.40	ZAR	
Hong Kong	HK\$11.25	\$1.44	ZAR	
Hungary	Forint 492	\$2.29	ZAR	
Japan	¥263	\$2.46	ZAR	
Malaysia	M\$5.10	\$1.34	ZAR	
Mexico	Peso22.0	\$2.03	ZAR	
New Zealand	NZ\$3.95	\$2.62	ZAR	
Russia	Rouble40.00	\$1.38	ZAR	
Singapore	s\$3.30	\$0.94	ZAR	
South Africa	Rand13.95	\$1.94	ZAR	
Sweden	Skr30.0	\$4.00	ZAR	
Switzerland	SFr6.35	\$5.00	ZAR	
Taiwan	NT\$70.55	\$0.09	ZAR	
Thailand	Baht55.0	\$1.30	ZAR	

#### Questions:

1. In which country is the Big Mac most expensive?
  2. In which country is the Big Mac the least expensive/cheapest?
  3. Which column did you use to compare the prices and why did you use this column?
  4. What is the Rand equivalent of a Big Mac for each of the countries listed in the table?
- (Hint: multiply column 3 by 7.19. You may use a calculator. Write your answers in column 4.  
Your answers should include 2 decimal places as in the example for the United States already provided).



## Answer Key

Column 1	Column 2	Column 3	Column 4
Country	Big Mac Price		Actual Exchange Rate 1 USD = ZAR 7.19 (as on 15 Jan 2004 Big Mac prices in terms of ZAR)
	In Local Currency	In US dollars	In SA Rands
United States	\$2.65	\$2.65	ZAR 19.05
Argentina	Peso 3.85	\$1.32	ZAR 9.49
Australia	A\$3.20	\$2.43	ZAR 17.47
Britain	£1.99	\$3.57	ZAR 25.67
Canada	C\$3.20	\$2.46	ZAR 17.69
China	Yuan9.95	\$1.20	ZAR 8.63
European Union	€2.75	\$3.40	ZAR 24.45
Hong Kong	HK\$11.25	\$1.44	ZAR 10.35
Hungary	Forint 492	\$2.29	ZAR 16.47
Japan	¥263	\$2.46	ZAR 17.69
Malaysia	M\$5.10	\$1.34	ZAR 9.63
Mexico	Peso22.0	\$2.03	ZAR 14.60
New Zealand	NZ\$3.95	\$2.62	ZAR 18.84
Russia	Rouble40.00	\$1.38	ZAR 9.92
Singapore	s\$3.30	\$0.94	ZAR 6.76
South Africa	Rand13.95	\$1.94	ZAR 13.95
Sweden	Skr30.0	\$4.00	ZAR 28.76
Switzerland	Sfr6.35	\$5.00	ZAR 35.95
Taiwan	NT\$70.55	\$0.09	ZAR 0.65
Thailand	Baht55.0	\$1.30	ZAR 9.35

<sup>1</sup> <http://www.oanda.com/products/bigmac/bigmac.shtml>

<sup>2</sup> [http://www.sati.web.za/downloads/Booklet\\_text.pdf](http://www.sati.web.za/downloads/Booklet_text.pdf)